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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/899,627	07/05/2001	Jong-won Lee	8021-55 (SS-14743-US)	5141

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10/08/2003

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EXAMINER

GUERRERO, MARIA F

ART UNIT

PAPER NUMBER

2822

DATE MAILED: 10/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/899,627

Applicant(s)

LEE ET AL.

Examiner

Maria Guerrero

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 21 August 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 12-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 12-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

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### **DETAILED ACTION**

1. This Office Action is in response to the Request for continued examination and the Amendment filed August 21, 2003.

Claims 1-11 and 27 are canceled.

Claims 12-26 are pending.

#### ***Continued Examination Under 37 CFR 1.114***

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 21, 2003 has been entered.

#### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 12-18 are rejected under 35 U.S.C. 102(e) as being anticipated by Aoki et al. (U.S. 6,524,376).

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4. Aoki et al. teaches forming a barrier layer (adhesive layer) along a stepped portion over the surface of an interdielectric layer having a recessed region (trench region and contact holes) (Fig. 1A, 8A, 10C, col. 14, lines 35-44). Aoki et al. discloses forming a copper seed layer by sputtering (physical vapor deposition) on the barrier layer (col. 14, lines 40-47). In addition, Aoki et al. shows exposing the barrier layer by chemical mechanical polishing using a solution comprising an oxidizing agent (hydrogen peroxide), a pH controlling agent, a chelate reagent, and water (col. 8, lines 20-50, col. 9, lines 1-11, col. 10, lines 10-15, col. 14, lines 50-65). Aoki et al. teaches the copper seed layer remaining only within the recessed region (Fig. 8B). Aoki et al. also shows forming a copper layer on the copper seed layer, the copper layer, the copper seed layer, and the barrier layer projecting in order above the surface of the interdielectric layer (Fig. 8A). Aoki et al. teaches planarizing the copper layer, the copper seed layer, and the barrier to form a copper interconnection layer (Fig. 8B, col. 13, lines 1-10).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 12, 16, and 18-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaufman et al. (U.S. 6,063,306) in view of Chan et al. (U.S. 6,495,200).

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6. Kaufman et al. teaches forming a barrier layer (adhesive layer) along a stepped portion over the surface of an interdielectric layer having a recessed region (trench region and contact holes) (col. 1, lines 5-20, 25-65). Kaufman et al. shows exposing the barrier layer by chemical mechanical polishing using a solution comprising an oxidizing agent, a pH controlling agent, a chelate reagent, and water (col. 3, lines 40-48, 60-67, col. 4, lines 1-5, 57-65, col. 5, lines 5-65, col. 6, lines 3-55, col. 7, lines 13-20).

7. Furthermore, Kaufman et al. discloses oxidizing agent being hydrogen peroxide or an oxidizing agent of an ammonium series (col. 5, lines 5-30). Kaufman et al. shows the oxidizing agent from the ferric series as conventional use in the art (col. 2, lines 35-40). Kaufman et al. teaches the oxidizing agent being in a range of 0.01% to 3.0% by weight or 0.3% to about 17% by weight, the chelate reagent (benzotriazole (BTA)) being in a range of 0.01 to about 1% by weight (col. 3, lines 40-48, col. 5, lines 30-37, col. 6, lines 24-40). Kaufman et al. teaches controlling the pH using an acid (nitric acid) or a basic solution (ammonium hydroxide) and the pH being from about 2.0 to about 12.0 (col. 7, lines 12-22).

8. Kaufman et al. does not specifically show forming a copper seed layer on the barrier layer. However, Kaufman et al. discloses forming a copper film on the barrier layer (col. 3, lines 60-67). Chan et al. shows the formation of the seed layer before forming a copper film as well known in the art (Fig. 1A-1D, col. 2, lines 10-32).

9. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to apply Kaufman et al. method to the copper film including the conventional seed layer as taught Chan et al. The modification would provide a process

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that would selectively polish the copper and barrier layer while avoiding the dishing and erosion problems (Kaufman et al., col. 3, lines 9-30).


**Conclusion**

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Wang et al. (U.S. 6,362,104), Lin et al. (U.S. 6,342,448), and Lee et al. (U.S. 6,506,682) show several steps related to applicant's disclosure.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Guerrero whose telephone number is 703-305-0162.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 703-308-4905. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

  
Maria Guerrero  
Patent examiner  
September 26, 2003